

REMARKS

Claims 1-54 are pending in the above-identified application. Claims 1-54 have been amended to further clarify the subject matter recited therein. Attached is a marked-up version of the changes made to the claims by this response. The attachment is captioned “**VERSION WITH MARKINGS TO SHOW CHANGES MADE**”.

I. OATH/DECLARATION

The Examiner notes that the application does not identify the post office address of each inventor and does not identify the citizenship of each inventor. As noted in the oath/declaration signed on January 7, 2000 and filed with the PTO on January 24, 2000, the post office address for inventor Edward Seppi is 320 Dedalera Drive, Portola Valley, CA 94028. Enclosed with this filing is a supplemental declaration from Edward Seppi indicating that he is a citizen of the United States. Applicants believe that this was the only information missing from the original declaration and that accordingly this objection has been addressed.

II. ANTICIPATION REJECTION

Claims 1-13, 20-24, 29-33, 36-37 and 40-54 stand rejected under 35 U.S.C. §102 as being anticipated by Hughes. Applicants respectfully submit that the claims of this application contain elements that are not found in Hughes, and therefore Hughes does not anticipate these claims.

A. “Target objects capable of becoming radioactive”

Independent claims 1, 41, 46, 47, 48, 51, 52, 53, and 54, and those claims depending from them (claims 2-30, 41-45, 49 and 50) include limitations directed to a “target object capable of

becoming radioactive upon receiving the emitted x-rays.” Hughes does not disclose a system for irradiating target objects that are capable of becoming radioactive or the use of targets that can become radioactive. Neither does Hughes disclose any methods for irradiating target objects that are capable of becoming radioactive.

Hughes, conversely, describes targets that reflect light for imaging to aid in the positioning of a radiation source relative to a patient. (*See, e.g.* Hughes, at 3:40-44, 53-58, and claim 1). The targets in Hughes do not receive ionizing radiation from the radiation source, as claimed in the present application, but instead they reflect infrared light for imaging. (Hughes, at 4:18-23). Moreover, the object receiving radiation from the radiation source in Hughes is a patient, and is not capable of emitting ionizing radiation. Because Hughes does not disclose a target object capable of becoming radioactive, amended claims 1-30 and 41-54 are not anticipated by Hughes.

B. “X-ray conversion target”

Similarly, independent claims 31, 41, 46, 47, 51, 52, and 54, the claims depending from them (claims 32-40, 42-45, 49 and 50) comprise limitations directed to an x-ray conversion target. Hughes does not disclose an x-ray conversion target for dispersing x-ray radiation. As mentioned above, the target objects in Hughes reflect infrared light for imaging. Hughes does not disclose the use of targets for the dispersion of x-ray radiation. The Office Action states that Hughes discloses an x-ray source that includes a linear accelerator having an x-ray generating target, relying on column 3, lines 7-15. But while Hughes does disclose a linear accelerator, neither the cited passage nor any other portion of Hughes discloses an x-ray conversion target. The system of Hughes applies radiation directly from a radiation source to a patient (*see* Hughes, at 3:15-35 & 5:49-51), and not from an intermediate source such as an x-ray conversion target. Thus, in addition to its other shortcomings, Hughes does not disclose an x-ray source for emitting x-rays from an electron beam, such as a linear

accelerator impinging upon an x-ray conversion target. Accordingly, claims 31-47, 49, 50-52, and 54 are all novel based on at least this limitation.

C. *“Means for shaping said x-ray beam”*

In addition to the other patentably distinct limitations of claim 3, the claim includes as a limitation a “means for shaping the x-ray beam.” The office action states that Hughes discloses “a means for emitting an x-ray beam including the x-rays and the apparatus for irradiating target objects further comprising means for shaping the x-ray beam (30).” Hughes does not, however, disclose a means for shaping the x-ray beam, but instead only discloses that x-ray radiation may be used to irradiate a patient. (Hughes, at 3:9-15). Thus, claim 3 is patentable based on this limitation as well as for the other novel and non-obvious limitations it contains.

D. *“Medical stent(s)”*

Claims 4 and 54 include limitations that the target comprises a medical stent. The Office Action states that Hughes discloses “a medical stent, and the relative positioning apparatus includes a stent relative position apparatus (52).” The device “52” shown in Figure 2 of Hughes, however, was described therein as “a truncated cone-shaped beam outlet end” of a radiation applicator. (Hughes, at 4:38-39). Thus, this device is not a medical stent, and Hughes does not elsewhere disclose medical stents or a medical stent relative positioning apparatuses. On the contrary, Hughes irradiates patients and not medical stents. (Hughes, claim 10, “A method of localizing radiation for application to a plurality of patients”). Accordingly, claims 4 and 54 are novel and non-obvious over the cited references based on the “medical stent” limitation as well as for the other patentably distinct limitations that these claims contain.

E. “Rotatable carousel”

Claims 5, 6, 31-40, 46, 50 and 53, and claims depending from them, include limitations directed to a “rotatable carousel” which can retain “target objects” for being “impinged upon” by the x-rays. The Office Action relies solely upon Figure 3 for this limitation, but Figure 3 merely discloses an applicator 20 “including four targets 22, 24, 26, and 28.” (Hughes, at 3:35). Instead of rotating, applicator 20 remains fixed relative to the target patient. (Hughes, at 5:1-3). Further, Hughes does not disclose a rotatable carousel at least a portion of which receives at least a portion of said x-rays. As noted above, the Hughes targets do not receive x-rays and are not capable of becoming radioactive, but instead are “imaged in order to calculate the spacing and the alignment of the radiation applicator relative to (the radiation source).” (Hughes, at 3:42-45). For these reasons, as well as for the other patentably distinct limitations in these claims, claims 5, 6, 31-40, 46, 50 and 53 should be allowed.

*F. “Tube assembly having a stationary member” or “tube assembly having a substantially stationary tube” and a “translation assembly for moving the target object along a path”
“positioned such that the target object receives said x-rays”*

Claims 7 and 13, and the claims depending from them (claims 8-12), have claim limitations directed either to a “tube assembly having a stationary member” or a “tube assembly having a substantially stationary tube.” In either case, the target is moved within the tube assembly such that the target receives x-rays from the x-ray source. The Office Action again points to Figure 3 of Hughes to satisfy this limitation, but there is absolutely no hint of a “tube assembly” that allows for the translation of the target object therein such that it receives x-rays. Further, nowhere does Hughes disclose that applicator 20 has a translation assembly for moving at least one target object within a stationary member or on a path impinged upon by x-rays from an x-ray source. Targets 22, 24, 26,

and 28 are not moved in a path impinged upon by x-rays from an x-ray source. Hughes discloses that the radiation beam travels through a beam inlet end and a beam outlet 56 (Hughes, at 4:38-44). Figure 3 (Hughes) demonstrates that targets 22, 24, 26, and 28 are outside the radiation path traveling through outlet 56. Moreover, Hughes discloses no element that moves a target object within a stationary member. By contrast, the object receiving radiation in Hughes, i.e., a patient, is not moved within applicator 20, but instead, applicator 20 is inserted into the target patient. (Hughes, at 3:29-30). As such, Hughes does not disclose a tube assembly, a stationary member or a translation assembly and therefore does not anticipate amended claims 7-13. These claims are accordingly patentably distinct based on these limitations as well as based on other patentably distinct limitations therein.

G. *“An electron beam that is directed perpendicular to the axis of rotation of the rotatable carousel”*

Claims 33 and 53, and the claims depending from them (claims 34-35), include a limitation that “an electron beam is directed perpendicular to the axis of rotation of the rotatable carousel.”

The Office Action points to Figure 2 of Hughes as purportedly disclosing this limitation. As noted above, Hughes discloses no rotatable carousel, and therefore does not anticipate these claims. Moreover, the office action refers to Figure 3 (applicator 20) as disclosing a rotatable carousel. As applicator 20 of the Hughes patent is fixed, it has no axis of rotation perpendicular to an electron beam. These claims are accordingly patentably distinct over the cited references because of this limitation and other patentably distinct limitations.

H. *Other limitations contained within the dependent claims*

In addition to the unsupported assertion that Figure 3 contains a “rotatable carousel,” and “tube assemblies,” and electron beams directed perpendicular to the axis of rotation of the rotatable

carousel, there are a number of other limitations that are generally referred to as being described in the Figures. Applicants dispute each of these allegations, but given that Applicants have already articulated numerous bases of patentability of all the rejected claims, Applicants simply demand that if these limitations are maintained as being provided by the reference, the Office is obliged to point out specifically where these limitations are disclosed. These limitations include the following:

“a fixed positioning member retaining at least one target object in generally fixed relation to said x-ray source while positioned in the path of said x-rays.” (claim 21)

“a chamber downstream of the x-ray source, the chamber including a target object entry port and wherein the relative positioning apparatus includes a translation armature extendable through the target object entry port.” (claims 29-30)

In order to anticipate, Hughes must disclose each and every limitation of the claims. As noted above, one or more limitations of all the claims, including claims 1-13, 20-24, 29-33, 36-37, 40-54, which were rejected based on Section 102, are not disclosed in Hughes. Therefore, Applicants respectfully submit that Hughes does not anticipate these claims or any dependent claims therefrom, and request that rejection under 35 U.S.C. § 102 be withdrawn.

III. OBVIOUSNESS REJECTION

Claims 14-19, 25, 26-28, 34, 35, 38 and 39 stand rejected under 35 U.S.C. § 103(a) as obvious over Hughes as applied to claim 1 and 24 above. For the reasons stated below, Applicants respectfully submit that these claims are not obvious in view of Hughes.

To properly reject a claim under 35 U.S.C. §103(a), the Manual of Patent Examining Procedure imposes a burden on the Patent Office to establish a *prima facie* case of obviousness:

The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of non-obviousness.

M.P.E.P § 2142. There are three basic criteria to a case of *prima facie* obviousness: i) there must be some suggestion or motivation to modify the references or combine the reference teachings; ii) there must be reasonable expectation of success in modifying or combining the references; and iii) the prior art references must disclose or suggest all of the limitations of the claimed invention. *Id.* In the present case, the office action has failed to meet these requirements.

At the outset, it should be noted that claims 14-19, 25, 26-28 all depend from independent claim 1 and therefore include all of claim 1's limitations. Because many of claim 1's limitations are not disclosed or suggested by Hughes, none of dependent claims 14-19, 25, 26-28 can be rendered obvious by Hughes. For example, as noted above, Hughes does not disclose a target object capable of becoming radioactive or a relative positioning apparatus operable to translate the target object relative to the x-rays as recited in amended claim 1. Moreover, it would not be obvious to one skilled in the art to incorporate a target object capable of becoming radioactive and a relative positioning apparatus operable to translate the target object relative to the x-rays with an x-ray source emitting x-rays. Because claims 14-19, 24, 25, 26-28 all depend from claim 1, the limitations of these claims are not disclosed or suggested Hughes. Applicants therefore request that rejection of claims 14-19, 24, 25, 26-28 under 35 U.S.C. §103(a) be reconsidered and withdrawn.

Regarding claim 14, the office action concedes that Hughes fails to teach a sensor that measures parameters selected from a group including electron beam current, temperature monitoring device, and a radiation detector and a control circuit controlling the electron beam provided by the electron beam source based on the parameters measured by at least one sensor. Thus, by the office

actions' own admission, claim 14 distinguishes from Hughes. The office action's bare statement that these limitations would have been obvious to one of ordinary skill in the art is insufficient to meet the burden of establishing a prima facie case of obviousness. As claims 15-18 all depend from claim 14, they also distinguish from Hughes. Moreover, claims 15-18 contain limitations that further distinguish from Hughes. For example, claim 15 recites "at least one sensor includes a radiation detector situated downstream of said relative positioning apparatus." As noted above, Hughes does not disclose a relative positioning apparatus. As another example, claim 16 recites "at least one sensor includes a metering circuit measuring the electric current received in said x-ray conversion target." This limitation is not disclosed or suggested by Hughes. For these reasons, none of claims 14-18 are obvious in view of Hughes. Applicants therefore request that the rejection of these claims be reconsidered and withdrawn.

Regarding claim 24, the office action concedes that Hughes fails to disclose the relevant limitations: the use of a heat transfer system that includes a conduit for conveying a heat transfer fluid. Instead, the office action merely relies on the unsupported statement that the requirements of claim 24 would have been obvious to one of ordinary skill in the art. These unsupported statements are insufficient to establish a prima facie case of obviousness. For these reasons, claim 24 is not obvious in view of Hughes. Because claim 25 depends from claim 24, it distinguishes from Hughes for the same reasons. Moreover, claim 25 adds further limitations that distinguish it from Hughes. Applicants therefore request that the rejection of claims 24 and 25 be reconsidered and withdrawn.

Regarding claim 26, the office action again relies on the bare argument that "[it] would . . . be obvious to one skilled in the art to utilize a thermal shield." Although, the office action describes the rationale for this argument as "the temperatures induced by a linear accelerator are substantial, and require a thermal shield," the office action presents no support for this statement.

Moreover, the office action presents no arguments regarding the positioning of the heat shield. For these reasons, the office action has failed to establish a prima facie case of obviousness of claim 26.

Applicants therefore request that the rejection of claim 26 be reconsidered and withdrawn.

Regarding claim 27, the office action again concedes that Hughes fails to disclose a target with a plurality of layers wherein at least a first one of the layers comprises x-ray generating material, and electron absorption capability.” Instead, the office action merely relies on the unsupported statement that “[i]t would be inherent in the art to utilize material in a target with x-ray generating material, and one would desire electron absorption in order to minimize scatter.” These unsupported statements are insufficient to establish a prima facie case of obviousness. Moreover, the office action fails to establish that all of the limitations of claim 27 are disclosed or suggested by the prior art. For these reasons, claim 27 is not obvious in view of Hughes. Because claim 28 depends from claim 27, it distinguishes from Hughes for the same reasons. Applicants therefore request that the rejection of claims 27 and 28 be reconsidered and withdrawn.

The office action does not articulate a basis upon which the subject matters of amended claims 34, 35, 38 and 39 as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. Accordingly, the office action has failed to establish a case of prima facie patentability. In spite of this, Applicants submit that Hughes does not disclose or suggest the limitations of amended claims 34, 35, 38 and 39. As noted above, Hughes does not disclose a rotatable carousel, a target object, or an x-ray conversion target. As such, Hughes fails to disclose each and every limitation in amended claim 31, the parent claim to claims 34, 35, 38 and 39. One of ordinary skill in the art would not be motivated to incorporate a rotatable carousel, a target object, or an x-ray conversion target with the other limitations recited in claim 31. Because Hughes does not disclose these elements, and one skilled in the art would not be motivated to

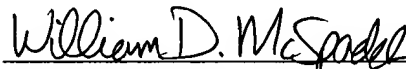
incorporate these elements in claim 31, it is not obvious in view of Hughes. Thus, because claims 34, 35, 38 and 39 depend from claim 31, there are similarly not obvious in view of Hughes. Applicants therefore request that rejection of claims 34, 35, 38 and 39 under 35 U.S.C. § 103(a) in view of Hughes be reconsidered and withdrawn.

CONCLUSION

This Response to Office Action cancels no claims and adds no new claims. Accordingly, no claims fees are required by the filing of this document. In the event, however, that any fees are required to cover the cost of this filing, the Commissioner is authorized to charge those fees, or credit any overpayment, to Account No. 13-0480, Attorney Docket No. 67110070.1003.

If the Examiner has any questions regarding this Response to Office Action or the Application in general, the Examiner is invited to contact the Applicants' attorney at the below-listed telephone number.

Respectfully submitted,



William D. McSpadden

Reg. No. 44,234

BAKER & McKENZIE

2001 Ross Avenue

Dallas, Texas 75201

(214) 978-3040 (telephone)

(214) 978-3099 (facsimile)

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In The Claims

Please amend claims 1-54 as follows:

1. (Amended) [An apparatus for irradiating target objects] A target irradiation system comprising:

an x-ray source [emitting] operable to emit x-rays;

[and]

a target object capable of becoming radioactive upon receiving the emitted x-rays;

a relative positioning apparatus [translating at least one of] operable to translate the target [objects positioned by said] object relative [positioning apparatus in relation to and impinging upon said] to the x-rays.

2. (Amended) The [apparatus] system as set out in claim 1 wherein said x-ray source includes a medical or industrial linear accelerator having an x-ray generating target.

3. (Amended) The [apparatus] system as set out in claim 1 wherein said x-ray source includes means for emitting an x-ray beam including said x-rays and said [apparatus for irradiating target objects] system further [comprises] comprising a means for shaping said x-ray beam.

4. (Amended) The [apparatus] system as set out in claim 1 wherein said target [objects include] object comprises a medical stent [and said relative positioning apparatus includes a stent relative positioning apparatus].

5. (Amended) The [apparatus] system as set out in claim 1 wherein said relative positioning [apparatus] system includes a rotatable carousel at least a portion of which is [impinges] impinged upon by and receives at least a portion of said x-rays, said rotatable carousel including at least one target mount for retaining at least one target object in fixed relation to said rotatable carousel.

6. (Amended) The [apparatus] system as set out in claim 5 wherein said rotatable carousel has at least one rotation angle at which each said at least one target mount is [impinges] impinged upon by and receives said x-rays emitted from said x-ray source and at least one rotation

angle at which said at least one target mount does not receive said x-rays.

7. (Amended) The [apparatus] system as set out in claim 1 wherein said relative positioning apparatus includes a tube assembly having:

a stationary member defining an interior path for receiving [at least one of said] the target [objects] object; and

a translation assembly for moving [said at least one] the target object along a path within said stationary member, said path [impinging upon] positioned such that the target object receives said x-rays emitted from said x-ray source.

8. (Amended) The [apparatus] system as set out in claim 7 wherein said stationary member defining an interior path is a tube.

9. (Amended) The [apparatus] system as set out in claim 7 wherein said tube assembly further comprises a heat transfer apparatus supplying a heat transfer fluid within the interior of said stationary member defining an interior path.

10. (Amended) The [apparatus] system as set out in claim 7 wherein said translation assembly includes linear and rotational translation apparatus.

11. (Amended) The [apparatus] system as set out in claim 7 further comprising a plurality of members each defining an interior path and having an associated translation assembly for moving at least one [of said] target [objects] object along said interior path within each said member defining an interior path, each said interior path [impinging upon] positioned to be impinged upon by said x-rays emitted from said x-ray source.

12. (Amended) The [apparatus] system as set out in claim 7 wherein said stationary member defining an interior path includes an x-ray source activated by said beam of electrons to emit x-rays.

13. (Amended) The [apparatus] system as set out in claim 1 wherein said relative positioning apparatus includes a tube assembly having:

a substantially stationary tube defining an internal target object conduit path; and

a translation assembly for moving [at least one of said] the target [objects] object within said stationary tube along a desired path [impinging upon] positioned to be impinged upon by said x-rays emitted from said x-ray source.

14. (Amended) The [apparatus] system as set out in claim 1 further comprising:
at least one sensor measuring parameters selected from a group including electron beam current, temperature, and radiation; and
a control circuit controlling the electron beam provided by said electron beam source based on said parameters measured by said at least one sensor.

15. (Amended) The [apparatus] system as set out in claim 14 wherein said at least one sensor includes a radiation detector situated downstream of said relative positioning apparatus.

16. (Amended) The [apparatus] system as set out in claim 14 wherein said at least one sensor includes a metering circuit measuring the electric current received in [said] an x-ray conversion target.

17. (Amended) The [apparatus] system as set out in claim 14 wherein said at least one sensor includes a temperature monitoring device measuring the temperature in proximity of said relative positioning apparatus.

18. (Amended) The [apparatus] system as set out in claim 14 wherein said at least one sensor includes:

a radiation detector situated downstream of said relative positioning apparatus; and
a metering circuit measuring the electric current received in [said] an x-ray conversion target.

19. (Amended) The [apparatus] system as set out in claim 1 further comprising a radiation detector downstream of said relative positioning apparatus.

20. (Amended) The [apparatus] system as set out in claim 2 wherein said x-ray conversion target further comprises a metering circuit measuring the electron beam current received by the x-ray conversion target.

21. (Amended) The [apparatus] system as set out in claim 1 wherein said relative

positioning apparatus includes a fixed positioning member retaining [said] at least one [of the] target [objects] object in generally fixed relation to said x-ray source while positioned in the path of said x-rays.

22. (Amended) The [apparatus] system as set out in claim 1 further comprising an electron beam directing apparatus between the electron beam source and [the] an x-ray conversion target.

23. (Amended) The [apparatus] system as set out in claim 22 wherein said electron beam directing apparatus includes a magnetic means for directing the electron beam.

24. (Amended) The [apparatus] system as set out in claim 1 further comprising a heat transfer system conducting heat away from [said] an x-ray conversion target.

25. (Amended) The [apparatus] system as set out in claim 24 wherein said heat transfer system includes a conduit for conveying a heat transfer fluid.

26. (Amended) The [apparatus] system as set out in claim 1 further comprising a thermal shield between [said] an x-ray conversion target and [said] at least one [of the] target [objects] object positioned on said relative positioning apparatus.

27. (Amended) The [apparatus] system as set out in claim 1 [wherein said], further comprising an x-ray conversion target includes a plurality of layers wherein:

at least a first one of said layers comprises [said] x-ray generating material;

at least a second one of said layers comprises an electron absorption apparatus between said x-ray generating material layer and said at least one target object positioned by said relative positioning apparatus.

28. (Amended) The [apparatus] system as set out in claim 27 further comprising a thermal shield between said x-ray conversion target and said relative positioning apparatus.

29. (Amended) The [apparatus] system as set out in claim 1 further comprising a chamber downstream of the x-ray source, said chamber including a target object entry port and wherein said relative positioning apparatus includes a translation armature extendable through said

target object entry port.

30. (Amended) The [apparatus] system as set out in claim 29 wherein said translation armature includes a linearly translatable member mounting for receiving said at least one target object wherein the linearly translatable member defines a translation path including a first position within said chamber [impinging] impinged upon by said x-rays, and a second position outside said chamber wherein said at least one target object is movable on said linearly translatable member between said first position and said second position, through said entry port.

31. (Amended) Apparatus for irradiating a target [objects] object comprising:
an electron beam source providing a beam of electrons;
a positioning assembly including a rotatable carousel having an axis of rotation and a radial edge, the electron beam source directing said beam of electrons to impinge upon and be received by the radial edge of said rotatable carousel, said rotatable carousel including:
an x-ray [generating material] conversion target in the rotatable carousel activated by said beam of electrons to emit x-rays;
a mounting station receiving at least one [of said] target [objects] object, said mounting station receiving x-rays emitted by said x-ray [generating material] conversion target.

32. (Amended) The apparatus as set out in claim 31 wherein said positioning assembly includes a plurality of mounting stations each mounting at least one [of said] target [objects] object in a generally fixed relation to said x-ray conversion target.

33. (Amended) The apparatus as set out in claim 31 wherein said electron beam is directed perpendicular to the axis of rotation of said rotatable carousel.

34. (Amended) The apparatus as set out in claim 33 wherein said x-ray [generating material] conversion target [includes an x-ray generating material doped] is located in said rotatable carousel.

35. (Amended) The apparatus as set out in claim 33 wherein said carousel includes a carbon-carbon fiber doped with said x-ray generating material.

36. (Amended) The apparatus as set out in claim 31 wherein said rotatable carousel is rotatable from a first position in which said mounting station is aligned with said electron beam and a second position in which said mounting station is outside the path of said electron beam.

37. (Amended) The apparatus as set out in claim 31 further comprising a heat transfer system conducting heat away from at least one of the carousel, x-ray conversion target and target object.

38. (Amended) The apparatus as set out in claim 37 wherein said heat transfer system includes a conduit for conveying a heat transfer fluid.

39. (Amended) The apparatus as set out in claim 37 wherein said heat transfer system includes a plurality of fluid conduits in said rotatable carousel.

40. (Amended) The apparatus as set out in claim 31 further comprising an electron beam directing apparatus between said electron beam source and said carousel.

41. (Amended) [Apparatus for irradiating target objects] A target irradiation system comprising:

an electron beam source providing a beam of electrons;

a positioning assembly including a linearly movable translation armature, said translation armature mounted to said positioning assembly at least for linear motion in an axial direction, and said translation armature including a mounting apparatus mounting at least one [of said] target [objects] object; [and]

an x-ray conversion target mounted on said translation armature between said translation armature and said electron beam source, wherein said x-ray conversion target defines a radial access region providing access to said at least one target object and said x-ray conversion target includes an x-ray generating material activated by said beam of electrons to emit x-rays; and

a target object capable of becoming radioactive upon receiving the emitted x-rays.

42. (Amended) The [apparatus] system as set out in claim 41 wherein:

said positioning assembly includes a means for moving said x-ray conversion target mounted on said translation armature between a first position range [impinging] impinged upon by said

electron beam, and a second x-ray conversion target position not [impinging] impinged upon by said electron beam; and

said positioning assembly includes a means for moving said at least one target object mounted on said mounting apparatus between a first target object position range corresponding to said first x-ray conversion target position range at which said at least one target object is positioned in the path of x-rays emitted by said x-ray conversion target and a second target object position not [impinging] impinged upon by said electron beam.

43. (Amended) The [apparatus] system as set out in claim 41 further comprising an irradiation enclosure defining an interior space wherein said first x-ray conversion target position and said first target object position are within the interior space defined by said irradiation enclosure and said second x-ray conversion target position and said second target object position are outside said irradiation enclosure.

44. (Amended) The [apparatus] system as set out in claim 41 wherein said x-ray conversion target is substantially planar.

45. (Amended) The [apparatus] system as set out in claim 41 wherein said x-ray conversion target has an arcuate cross-sectional shape.

46. (Amended) [Apparatus for irradiating target objects] A target irradiation system comprising:

an electron beam source providing a beam of electrons on a path;

a rotatable carousel including:

a plurality of x-ray conversion targets circumferentially positioned on said carousel, each of said plurality of x-ray conversion targets including an x-ray generating material activated by said beam of electrons to emit x-rays when positioned in the path of the electron beam;

a plurality of mounting stations to receive at least one of said target objects, each of said mounting stations associated with one of said x-ray conversion targets and located on said carousel downstream its associated x-ray conversion target in the path of x-rays emitted from the associated x-ray conversion target when the x-ray

generating material of the associated x-ray conversion target is activated by said beam of electrons to emit x-rays; and
a target object, wherein the target object is capable of becoming radioactive upon receiving the emitted x-rays.

47. (Amended) [Apparatus irradiating target objects] A target irradiation system comprising:

an electron beam source providing a beam of electrons;
an x-ray conversion target in fixed relation to the electron beam source in the path of the beam of electrons from the electron beam source, the x-ray conversion target including an x-ray generating material activated by the beam of electrons to emit said x-rays;
a target object capable of becoming radioactive upon receiving the emitted x-rays;
an electron beam directing apparatus between the electron beam source and the x-ray conversion target; and
a retaining apparatus retaining the target object in [fixed] relation to said electron beam source.

48. (Amended) [Apparatus irradiating target objects] A target irradiation system comprising:

an x-ray source means for generating x-rays; and
a positioning means for positioning at least one [of the] target [objects] object in the path of said x-rays [emitted] generated by said x-ray source means, including means for moving at least one [of the] target [objects] object in relation to said x-rays [emitted] generated by said x-ray source means; and
a target object capable of becoming radioactive upon receiving the generated x-rays.

49. (Amended) The [apparatus] system as set out in claim 48 wherein said x-ray source comprises:

an electron beam source means providing a beam of electrons;
an x-ray conversion target means in fixed relation to the electron beam source in the path of the beam of electrons from the electron beam source, the x-ray conversion target means including an x-ray generating material means for emitting x-rays when activated by said beam of electrons.

50. (Amended) The [apparatus] system as set out in claim 47 wherein said positioning means comprises a carousel means including target object mounting means.

51. (Amended) [Apparatus for irradiating target objects] A target irradiation system comprising:

an electron beam source providing a beam of electrons;

a positioning means including a means for linearly translating a translation armature for linear motion in an axial direction, and said translation armature including a mounting means for retaining at least one [of said] target [objects; and] object;

an x-ray conversion target means mounted on said translation armature between said translation armature and said electron beam source, wherein said x-ray conversion target means defines a radial access region providing access to said at least one target object and said x-ray conversion target includes an x-ray generating material activated by said beam of electrons to emit x-rays; and

a target object capable of becoming radioactive upon receiving the emitted x-rays.

52. (Amended) A method of irradiating a target [objects] object comprising:

providing a beam of electrons;

positioning an x-ray conversion target in fixed relation to said beam of electrons and impinging upon and receiving said beam of electrons;

emitting x-rays from the x-ray conversion target when activated by said beam of electrons;

[and]

selecting a target object capable of becoming radioactive upon receiving the emitted x-rays;

moving at least one of [the] target [objects] object in relation to said x-ray conversion target and in the path of the x-rays emitted by said x-ray conversion target.

53. (Amended) A method of irradiating a target object in a rotatable carousel having an axis of rotation comprising:

selecting a target object capable of becoming radioactive upon receiving x-rays;

placing [a] the target object in an aperture in the rotatable carousel;

providing a beam of electrons substantially perpendicular to said axis of rotation of the carousel;

activating an x-ray generating material in the rotatable carousel with said beam of electrons to emit x-rays; and

impinging [receiving] at least a portion of said x-rays [in said] upon the target object placed in the aperture.

54. (Amended) An irradiated medical stent produced using a process comprising the steps of:

providing a beam of electrons;

providing an x-ray conversion target in fixed relation to the beam of electrons;

emitting x-rays from the x-ray conversion target when activated by said beam of electrons;

and

moving at least one [of the target objects] medical stent in the path of said x-rays emitted by the x-ray conversion target.